UNM VALENCIA

Name of Department:	Business and Technology
Instructor Name: Office Location Office Hours E-mail Telephone Class Meeting Days/Times Location	Sandra McCardell B110 (classroom) Mondays at 5:30 pm and by Appointment EMAIL IS THE BEST METHOD OF COMMUNICATION: smccardell48@gmail.com or mccardel@unm.edu Cell (txts ok) 505 795-2702 Mondays starting January 25, 2016, 6 – 7 pm B110

Title of Course:	**Renewable Energy in Buildings**
Course Number	Sust 150 501
Course Description	This course is an introduction to Renewable/Sustainable Energy Systems and their appropriate use; well established technologies, such as Solar Hot Water and Space Heating, Photovoltaic Electrical Systems, Passive Solar Design, and Wind Energy Systems will be examined and observed if possible. The course will provide students with sufficient background for furthering their studies in specific Energy-System disciplines. Course materials will consist of books and online resources, and homework will include papers and projects. Classes will focus on discussion and, as a "hybrid" course, significant online research, work, and reading will be required.
Credit Hours and Contact Hours	3 credit hours
Pre-requisites/co-requisites	None
Learning Objectives and Outcomes	• Understand terminology related to building energy use. • Understand the basic principles of sizing an RE energy system. • Understand the better known and established RE technologies and their appropriate use. • Learn about RE incentive programs. • Provide exposure to RE systems

Course Outline

WEEK / DATE	TOPICS	In-class Homework & Discussions	HOMEWORK FOR FOLLOWING CLASS
Week 1 January 25	• Pre-class		• Come to class prepared to discuss: ○ Your background (as it relates to the class) ○ Your interest in renewable energy ○ What you would like out of the class
Week 2 February 1	• Introduction to class / syllabus • Introduction to Renewable	• How to read utility bills • Why is Renewable Energy important?	• Bring in your energy bills (electricity and gas or propane) – at least one summer month and one winter month • Bring in a list of the 5 largest energy "hogs" you believe you have

	Energy • Google Drive setup – recommendations and presentations		in your home • RE Handbook Introduction and Chapter 2, Energy Efficiency • HP 157, page 82 – Windows • HP 165, page 26, Reducing Energy Use • HP 165, page 34 Lights • RECOMMENDATION: Google "renewable energy products" and find one that you would like to recommend to the rest of the class. Put a link with your name, the date and that title, in the googledrive, with a very brief description of why you think it is a good idea.
Week 3 February 8	• Energy Efficiency	• How have buildings gotten to be so "inefficient"? Is that good or bad? What can be done to make buildings more energy efficient?	• RE Handbook Chapter 3, Renewable Energy • HP 163, p. 32 Light Clay-Straw and Solar for sustainability and Efficiency • HP Magazine – Read through one entire magazine online (your choice) and put a link to the most informative renewable energy article in that issue, in the GoogleDrive. • PROJECT #1: Bring in an outline for presentation and discussion: o What types of energy are there? Which do you consider to be "renewable"? Which could you imagine using, and how? Which seem unlikely / "fantastic"? • RECOMMENDATION: Find a link to one energy efficiency recommendation you think your classmates should pass on to their families / roommates / friends. Post in Googledrive
Week 4 February 15	• Types of Renewable Energy in buildings, communities, and transportation	• PROJECT #1 PRESENTED • Appropriate uses for different RE technologies currently available • Renewable Energy in the future	• RE Handbook Chapter 4, Showcase of Homes • Look at listings online for "green" homes, or homes with Renewable Energy features. Bring links to show others, and be prepared to explain what you find interesting (or confusing!) • HP 170, p. 24 High performance • HP 156, p. 38 Green, greener, greenest • HP 165 p. 16 retrofitting a manufactured home • HP 168, p. 46, comfortably off grid • RECOMMENDATION: Find a link that describes a transportation fuel that you think has promise in about 3-5 years, and post in Googledrive for other classmates to consider; note why you think it will be a good thing.
Week 5 February 22	• Examples of Renewable Energy in buildings	• What makes a home green? • When should renewable energy technologies	• RE Handbook Chapter 5, Heating and Cooling • HP 155 p. 76 Solar hot water pump • HP 154 p. 90 More efficient active (cooling) systems • Outline for discussion – How do we heat and cool our buildings

		increase the value of a building?	now? 100 years ago? 200 years ago? 1,000 years ago? • Find a description to a building using "traditional" heating and cooling techniques, with a photo, and bring that link for discussion. • RECOMMENDATION: Develop a checklist of 5-10 things to look for in buying a home based on what we have discussed so far, and post it in the Googledrive for other students.
Week 6 February 29	• Heating and Cooling with Renewable Energy • Study Sheet for Midterm handed out	• What historical trends have affected heating and cooling? • What are the implications of "standard" heating and cooling technologies?	• RE Handbook Chapter 6, PV Electricity Generation • HP 155 p. 66 – Siting • HP 163 p. 58 – DIY • Research and bring in prices for discussion 2 "bids" for a home solar system • Study for take-home midterm
Week 7 March 7	• Photovoltaics	• Questions from study sheet? • Are solar systems expensive? • How can you assess a proposed solar system?	• RE Handbook Chapter 7 Wind, and 8 Micro-hydro • HP 170 p.34 Designing a microhydro system • HP 170 p.14 Hydro measurements • HP 167 p.50 Wind • HP 168 p.25 Portable power • TAKE HOME MIDTERM DUE BY FRIDAY MARCH 11 5 PM
March 14	• SPRING BREAK	•	•
Week 8 March 21	• Wind • Micro-Hydro	• Is Microhydro applicable in NM? • Where is wind appropriate?	• RE Handbook Chapter 9 Batteries, and Chapter 12, Backup Systems • HP 170 p. 44 Backup Power for grid-tied PV systems • HP 157 p.74 Understanding batteries • Outline for discussion: When are backup systems needed and when are they not? • Research for discussion: What does the term "resilience" mean in the context of energy? • RECOMMENDATION: Research Climate Change online, and post to Googledocs links to 5 of the most informative discussions on it. Summarize the points and what you have learned about the topic. Be prepared to discuss.
Week 9 March 28	• Backup Systems	• Resilience • Climate Change	• RE Handbook Chapter 10, DC Voltage Regulation and Chapter 11, DC to AC conversion • PROJECT #2: You are charged with designing a "net zero" house in Los Lunas, and another one in Newfoundland (Canada). Make a list of the components you would include for each house, and either sketch the houses or describe them in several paragraphs. Come prepared to present. • RECOMMENDATION: Research one particular type of DC

			appliance (refrigerator, washer / dryer, etc.) and post in GoogleDrive a recommended manufacturer and model, along with your comment for why you recommend it.
Week 10 April 4	• DC and AC Systems	• PROJECT #2 DUE AND PRESENTED	• RE Handbook Chapter 13, Putting it all together • Sketch the components of a grid-tied system and a standalone system; note whether the systems is designed to be AC or DC. • RECOMMENDATION: Make a checklist of at least 5 potentially dangerous situations that could be created in a renewable energy installation, with ways they can be avoided. Keep your fellow students out of trouble! (And post in GoogleDrive)
Week 11 April 11	• Combining everything into a system	• Systems and implications	• RE Handbook Chapter 16, Biofuels • HP 167 p.44 hydrogen cars • Research negative aspects of biofuels, and do a summary table which shows for 5 - 10 articles: Type of biofuel, Year published, argument against, author's organization, and link to the article. Was the argument valid then? Is it valid now? Was the author being even-handed? Come prepared to discuss. • RECOMMENDATION: Please provide a simple set of instructions for class members who are interested in putting in a hot tub powered by solar energy, and post in GoogleDrive.
Week 12 April 18	• Biofuels	• Advantages and disadvantages • "Systems thinking" • Appropriate skepticism	• RE Handbook Chapter 14 Pools, and Chapter 15 Communications • HP 155 p.46 Saving with solar pool heating • HP 156 p.78 swimming pool energy efficiency • Bring in links to at least 5 "miscellaneous" renewable energy systems – all different. They can be your own photos or collected online. • PROJECT #3 ASSIGNED, DUE ON MAY 14: Imagine that you have just had a brilliant idea for a project or a product which either uses or produces a biofuel. You are hoping to get a friend involved in helping you develop it, but your friend likes to have everything on paper. Prepare a description (at least 5 pages) of your idea and what is needed to make it successful. Be prepared to give a brief summary to the class.

Week 13
April 25
	• Miscellaneous Renewable Energy Systems
	  ○ Waste
	  ○ Pools
	  ○ Communications
		Other potential uses for renewable energy
		"Zero Waste" / circular projects
			• RE Handbook Chapter 17 Practical Living and Chapter 18, Conclusion
			• Do a 1-2 page paper including brief descriptions of the renewable energy technologies you could imagine using, in what way, and for what purpose, as well as a summary of those you could never imagine using.

			• RECOMMENDATION: Look through the Appendices in the RE Handbook, and list the top 2-3 most informative ones, with your comments. Post to GoogleDocs.
Week 14 May 1	• Practical Living • Study sheet	PROJECT #3 DUE AND PRESENTED Study sheets discussed	• Study for Final Exam
Week 15 May 9	• Final Exam • Discussion / evaluation	Final exam	• Final Exam

Teaching Methods (Lecture, Discussion, On-Line Components and discussions, Group and/or Individual projects, Field Trips as possible):

This course will be a combination of lectures, discussion, projects, and online work. Since the class meets only once a week, significant research and report work (sometimes in groups) will be required between classes. Both group and individual projects may be assigned, and will be presented to the full class. In order to do well in this class, attendance and participation are important.

Evaluation/Grading Methods *(Attach Rubric if available)*

There will be a mid-term and a final exam as well as 3 group or individual projects assigned to be completed during the course. The projects will be presented to the class for discussion. Projects may be assigned for extra credit at the discretion of the instructor. Students should understand that all components are important in order to succeed in this course. Late assignments will be marked down, and consistent late arrival will also be penalized. Each week, a "recommendation" will be required of each student, those will be dated with the student's name and posted on a googledrive that will form part of the grade as well.
In-class discussion and "check in" homework: 30% Mid-term: 20% (3)Projects: 30% Final Exam: 20%

Required Text(s) & Supporting Materials (*Many programs will require these to be common across different sections --Check with Chair*)

REQUIRED PUBLICATIONS:

The Renewable Energy Handbook, William H. Kemp, Aztekt Press 2009

Online Subscription to Home Power Magazine, 3 year subscription , https://homepower.com – 1 year premium access digital, $39.95

ADDITIONAL RESOURCES:

- Online articles on Renewable Energy will be assigned and used extensively.
- SimBuilding, a free online resource for energy use and photovoltaic panel modeling, will be introduced; students will work with the program.
- Additional resources may be recommended, placed in the library for research, or loaned to students doing specific research.

A 3-ring binder and a thumb drive are also recommended for this course.

Other materials may be distributed through WEBCT or handed out in class, and links to additional web-based materials may be provided for much of the homework. Specific assignments may be changed to respond to class interests or outside events.

Assessment Methods *(How learning objectives will be measured; attach rubric if appropriate)*

Grading Scale:

100-93= A	92 - 90 = A-	89-87 = B+	86-83 = B	82-80 = B-	79 - 77 = C+
76-73 = C	72-70 = C-	69-67 = D+	66-63 = D	62-60 = D-	Below 60= F

Grades will be issued based on the following criteria:

- Quality of work
- Quality of composition

- Timeliness of work
- Judgment and decision making
- Understanding of materials presented
- Quality of research
- Quality and professionalism of presentation
- Class discussion

Attendance Policy and policies on classroom behavior (use of cell phones, academic dishonesty, computers, etc.)

Attendance is expected in all class sessions and participation in discussion of topics is critical to success. Students who miss sessions should see the instructor as soon as is possible after the missed session. In Class Work is work that cannot be made up. You will have to be present to get credit for this work. The student's final grade will be lowered one point for each additional absence in excess of two (2). Students should note that it is highly unlikely they can pass this class without an excellent attendance record.

The Use of cellular telephones is not permitted during class. Computers are provided in the classroom, so either thumb drive or lap-top computers may be used for taking notes, accessing homework assignments and other relevant materials, and for reference when making class presentations. No non-class related use of lap-tops in class (social networking, VOIP programs, etc.) will be permitted.

Students are expected to read the assigned chapters and other materials prior to class, and to bring in homework assignments when those have been handed out. Late assignments will be marked down.

Students are expected to take tests and exams when they are scheduled. In unusual circumstances and if the instructor has agreed PRIOR TO THE TEST DATE, a test may be made up, but the results will be marked down.

Some projects may be group projects, and the reports and presentations for those group projects will be considered to be joint efforts. ALL other work submitted is to be an original, individual effort. Copying or exchanging of solutions will be reason to dismiss a student from class, thus receiving a grade of F.

PLAGIARISM: Plagiarism implies copying work produced by someone else. Each student is expected to produce his/her own work. A student who is found guilty of cheating and/or plagiarism will automatically receive an **F** for the course. **The student may also be suspended.**

Students must adhere to **UNM's policy on Dishonesty in Academic Matters**, which reads as follows:

"*Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, including dismissal, against any student who is found responsible for academic dishonesty. Any student who has been judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course.*

Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests or assignments, claiming credit for work not done or done by others; hindering the academic work of other students; and misrepresenting academic or professional qualifications within or outside the University."

Computer Lab Responsibility:

Please be advised that use of computer labs on UNM properties is governed by "Policy 2500: Acceptable Computer Use" which can be found at http://policy.unm.edu/university-policies/2000/2500.html. Food and drink are also prohibited in any computer lab on campus. Anyone violating these policies is subject to possible suspension and loss of computer lab privileges.

UNM Email/Black Board Learn Access:

Beginning Fall 2015 semester, all UNM-Valencia students will need a UNM Net ID which can be created by going to: http://it.unm.edu/accounts/. UNM Net ID will give you access to the computer labs on campus, blackboard learn and UNM Email. ***All students MUST have a UNM Net ID to access these resources.***

Additional topics, information determined by the course instructor and not inconsistent with the syllabus may be added during the course.